

a general character, all of which, it may be remarked, have in this article already been given in an introductory description of general properties of the group.

Apart from details, nearly all the articles which deal with subjects of general interest will be found to present a well-known and familiar appearance to the biochemist. Any laboratory which possesses E. Fischer's work on the amino-acids and polypeptides can have little service for the present monograph on the same subject in this series. The article on the vegetable proteins in the "Biochemischen Arbeitsmethoden," written by the same author, edited by the same editor, and issued by the same publishing house (reviewed in NATURE a few months ago), takes much of the wind out of the sails of the article on the "Proteine der Pflanzenwelt" in the present colossal work, which is appearing simultaneously with the equally colossal "Handbuch der biochemischen Arbeitsmethoden" under Prof. Emil Abderhalden's guidance.

There would appear to be a paying market for any large work on chemistry issued in Germany, for that country seems to have become the world's factory for this type of literature, and of all German editors Prof. Emil Abderhalden seems to be the most prolific, as witness the twin works, each of about seven volumes, and each volume so fat that it becomes itself a twin, issuing at the same time under his editorship. But one occasionally feels there can be too much of this thing, and is inclined to cry out, "Halt, halt; we must work as well as read," and spend our money, at least in part, upon materials and equipment for our laboratories, which bid fair to be starved by too much cooking for our libraries.

BENJAMIN MOORE.

METABOLISM OF PLANTS.

Der Stoffwechsel der Pflanzen. By Prof. A. Nathansohn. Pp. viii+472. (Leipzig: Quelle and Meyer, 1910.) Price 12 marks.

THE great advances that have been made in recent years in research into the leading principles and fundamental facts of the physiology of plants have made it necessary to specialise in particular directions, and the literature of the subject shows in consequence a tendency to deal with two aspects of the general life of plants almost entirely apart from one another. Of these the first embraces the phenomena of the individual life; the second, the relations of the individual to the conditions of its environment. In the present volume Dr. Nathansohn has undertaken to deal almost exclusively with the former of these problems, and has set before himself the task of discussing the present position of the metabolic phenomena characteristic of the green plant. The book is not intended to displace the standard text-books on the subject, but to deal more exhaustively than is possible in the latter with the gradual unfolding of knowledge and the gathering together of the mass of detail which has been accumulating for the past decade or longer.

In pursuance of this design he has dealt with his NO. 2164, VOL. 86]

subject in eight sections, following the general line of treatment of his predecessors. Beginning with the absorption of material from the soil and the atmosphere, he deals with the construction and management of foods, certain problems of nutrition, immediate and deferred, respiration and the regulation of energy, and the phenomena of secretion and excretion.

The discussion of the first of these questions, involving the absorption and transport of water, involves the examination of many physical and chemical questions, which are ably handled, with a due avoidance of dogmatism. The author introduces the second problem with a historical summary of the earlier work on the question of photosynthesis, or, as he prefers to call it, carbon dioxide assimilation. It is a little disappointing to find him almost stopping short here with the researches of the Sachsian period, and dealing very briefly with the result of later investigations. His treatment of the metabolic processes and phenomena in which non-nitrogenous substances are concerned leads one to regret that while the sugars are dealt with at great length, he has very little to say about the glucosides, inulin, and the celluloses. The metabolic phenomena in which these are concerned are of considerable importance, and a graphic presentation of them is just now much to be desired. In his treatment of nitrogenous substances, too, Dr. Nathansohn has dealt at some length with the proteins, giving them, as is natural, a position commensurate with their importance in metabolism; but he leaves us wishing he had devoted more space to such bodies as the alkaloids, which he dismisses somewhat briefly.

While appreciating the great amount of valuable material which the book contains, the English reader will be struck with particular deficiencies. The point of view leaves something to be desired. The book treats of the plant as a machine rather than as a living organism. No doubt it is a machine, but it is much more than that; it is capable of regulating all its chemical and physical processes according to its requirements from time to time and to the variation of external conditions. The part played by the living substance in the various changes and rearrangements that constitute metabolism is only too easily lost sight of. It is especially necessary to emphasise this fact, particularly in the discussion of the respiratory phenomena, or one might suppose that the respiratory interchanges take place for the most part without any involvement of the protoplasm, as if sugars, or fats, or what not, are oxidised in the cell by direct action of oxygen upon them. The fact that respiration is an indication of profound auto-decomposition and reconstruction of the protoplasmic molecule might have been made more impressive to the reader of the chapters which deal with this subject.

Another feature which is very remarkable is the narrow range of literature which the author quotes. Out of a total of some 450 references, a bare dozen or so are English, and scarcely more than a score are French. The English reader will certainly regret the very scant attention that has been paid to Eng-

lish researches. Surely in the story of the metabolism of the carbohydrates room might have been found for the classic work of Brown and Morris, and Brown and Escombe on the physiology of the foliage leaf and of the germinating barley grain; in other places for the work of the Cambridge school on the enzymes, the phenomena of gaseous interchange, and the conditions of respiration; and for the researches of Chittenden, Vines, and others on the phenomena of proteolysis. The discovery of erepsin is not mentioned, though its importance in the metabolic phenomena of proteins is beyond dispute. The author is apparently satisfied with the researches of the German scientific world, which, from the point of view of the advancement of knowledge, can only be regretted.

J. R. G.

AGRICULTURAL ESSAYS.

Lectures Agricoles. By Prof. C. Seltensperger. Pp. 576. (Paris: J.-B. Baillière et Fils, 1911.) Price 5 francs.

“**I**l y a trois manières d'enseigner : on peut instruire en amusant, instruire en ennuyant, et même ennuyer sans instruire.” The book before us opens with this incontestable statement, and when we reach the end we feel that the editor has kept well clear both of the second and third methods, and has succeeded in maintaining interest throughout.

The plan of the book is, we believe, entirely new in agriculture. It is not a text-book in the ordinary sense of the word. There is a scheme running through it, but the chapters are not written by one author, or even written expressly for the book, but are taken from the writings of the best known French agriculturists. Thus there is a lack of continuity and an absence of detail, but by way of compensation the reader gets a fine breadth of view, and he is introduced to the best agricultural experts in his country.

M. Schloesing writes on the soil, and succeeds in a very few pages in giving a picture that will carry the student a long way in his studies. M. Nivoit writes on railways and agriculture; he points out that France is not specially rich in minerals, but she has a good soil and an incomparable geographical position; thus a great variety of crops is possible, and good transport facilities become indispensable. Instances are given of what has already been accomplished : the Compagnie Paris-Lyon-Méditerranée carries fruit from Avignon to Paris in 24 hours, to London in 40 hours, to Hamburg and Berlin in 80 hours. The advantage to the grower is enormous, but the local consumer may suffer; where formerly he could often buy fruit at very low prices, he may now have to pay actually more than in some of the markets further off. This, however, is a detail that is easily remedied.

The applications of electricity in agriculture are dealt with by M. Petit. It is regarded only as a source of power, the direct effects of the discharge on plant-growth not being considered. As a driving power it has many advantages, and it is attracting attention in France; for us here, unfortunately, it is as yet inaccessible in country districts.

A number of chapters deal with the general economic

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and social problems of agriculture. Where there are so many small holdings and so few hedges as in France, the question of boundary lines between one man's property and his neighbours' becomes a fruitful source of dispute and of vexatious litigation. M. Muret deals with this problem, and gives some very useful advice to the disputants.

There are a number of admirable illustrations throughout the volume, which, however, are not always connected with the text, and are sometimes not even explained. In several chapters, especially those dealing with insect and fungoid pests, the absence of detail is felt more than it is elsewhere. References are, however, always given to inexpensive text-books where the further information can be obtained. Considering the very wide range covered—practically the whole of the agriculture of France—and the very modest price of the book, it must be put down as one of the most generally useful of the admirable series to which it belongs.

MICROSCOPY FOR ZOOLOGISTS AND ANATOMISTS.

Grundzüge der mikroskopischen Technik für Zoologen und Anatomen. By A. B. Lee and P. Mayer. Vierte Auflage. Pp. vii + 515. (Berlin: R. Friedländer and Son, 1910.)

In this the fourth edition of an established publication the authors have not found it necessary to make any material alteration in the contents of the previous edition. They have added, however, much new substance derived mainly from various microscopical journals; medical periodicals, numerous though they be, having, to the authors' regret, been almost entirely unproductive. As will be gathered from the title the scope of the work is limited to anatomical and zoological microscopy. Such limitation is strictly observed. Even in the general paragraphs all temptation to wander off into by-paths is sternly resisted. Although the authors give freely of their own experience, they refer largely to the labours of others. The book is, in fact, crowded with condensed information, which has been industriously and exhaustively compiled during the last four years from suitable sources in many languages. References to these sources are always given. Nine chapters (131 pages) are devoted to the preliminary operations of killing, fixing, hardening, and imbedding. Seven chapters (94 pages) deal with staining; five (45 pages) with cements, varnishes, injections, and bleaching. Nine (140 pages) of the remaining ten chapters treat minutely the specific examination of the embryo and of various tissues and organs: one chapter (39 pages) is restricted to invertebrates. There is a copious index of no less than sixty-two pages, so that consultation of the contents is easily made.

A glance at any chapter, or group of chapters, readily reveals the thoroughness of compilation and the judgment of the authors. Thus, the essential process of imbedding is introduced by a general chapter (No. 6) on the subject. This chapter (*inter alia*) summarises the merits and demerits of the chief varieties of microtomes. It also summarises the ad-